PHOS shift user manual

Version 20.10.2010

The person, who needs access to the shifts, first of all should send a mail demanding the permission to work in a shift from one of the following coordinators:

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To find out who is the PHOS On Call Shifter,

1) go to the Shift Signup System (SMS), log in
2) click on Current Shift Crew (in left panel)
3) click on OnCall Shifters

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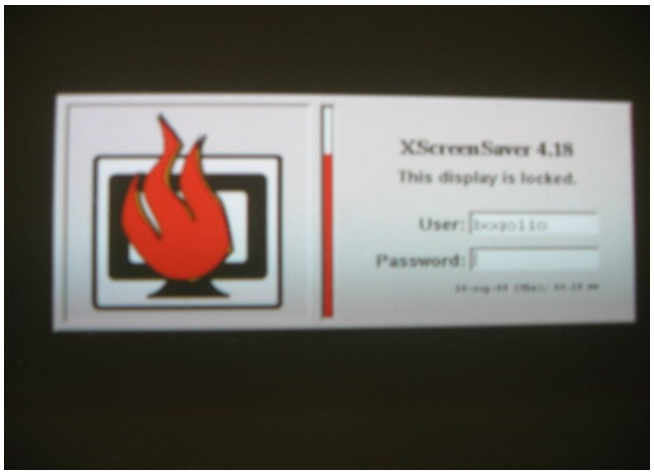
1. General

PHOS is controlled from the two PCs aldaqacr48 and aldaqacr49 in the ALICE Control Room (ACR). The DCS system is run from the windows machine alidcscom072 and the front-end cards and RCUs are controlled from the linux machine alidcscom075. One logs on to these machines from aldaqacr48 and 49. On alidcscom072 each user logs on with his/her own username (CERN nice username) and on alidcscom075 the user is phs.

Login to aldaqacr48 and aldaqacr49



Login: phos

Password: …….

(all passes are at the PHOS working place in ACR on paper)

Hint: If only one of the two screens are on – press ctrl-alt-F1, wait, and then press ctrl-alt-F7

Connecting to DCS

1) Open Xterm on aldaqacr49, type the command:

rdesktop alidcscom072 –f

- login using NICE username and password.

If the authorization window is not opened automatically, go to the start panel and click PHOS. (To leave full-screen mode: ctrl-alt-enter.)

2) The authorization WINDOWS login-window will appear (fig.1):

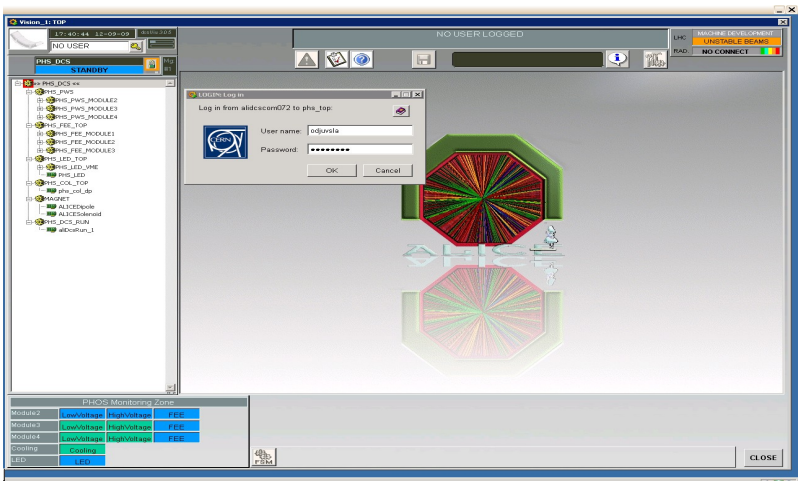


Fig.1

- You should use the NICE login and password here as well.

1. The following window will be opened - the ALICE Main User Interface (**MUI)** of DCS system for PHOS project (fig.2). This details of this window are described in App. A.

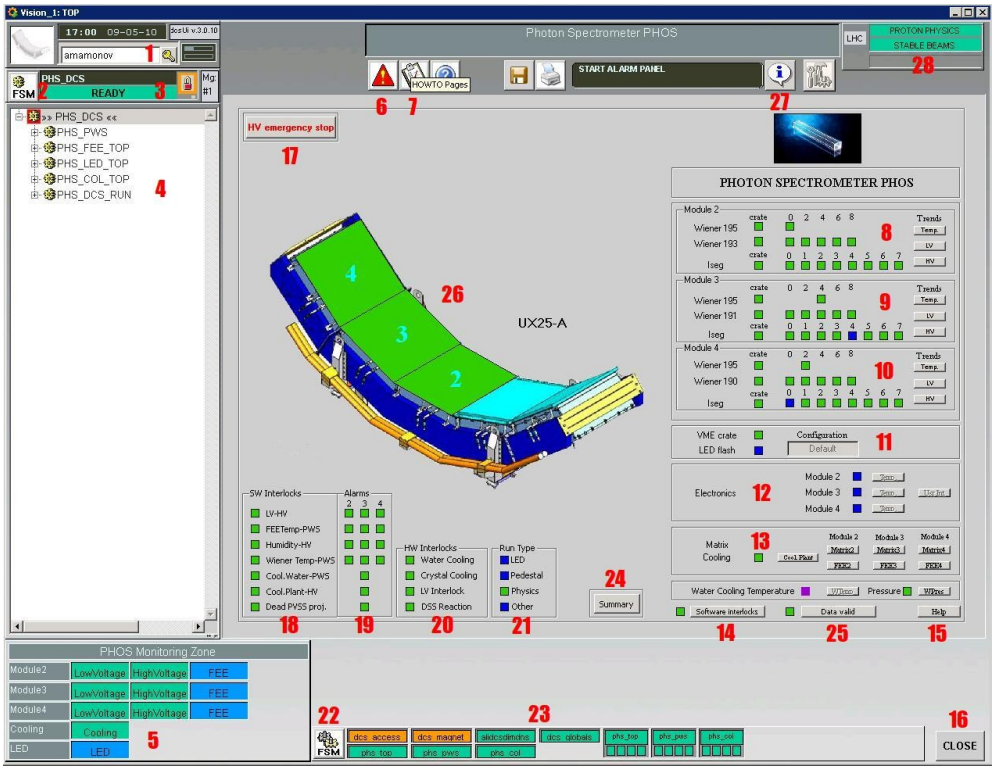


Fig.2 ALICE Main User Interface (**MUI).**

Configuring the electronics, turning on/off FEE cards

To start the phosgui, log in as user phs on alidcscom075. This is set up by ssh keys from aldaqacr48 and 49. Just do

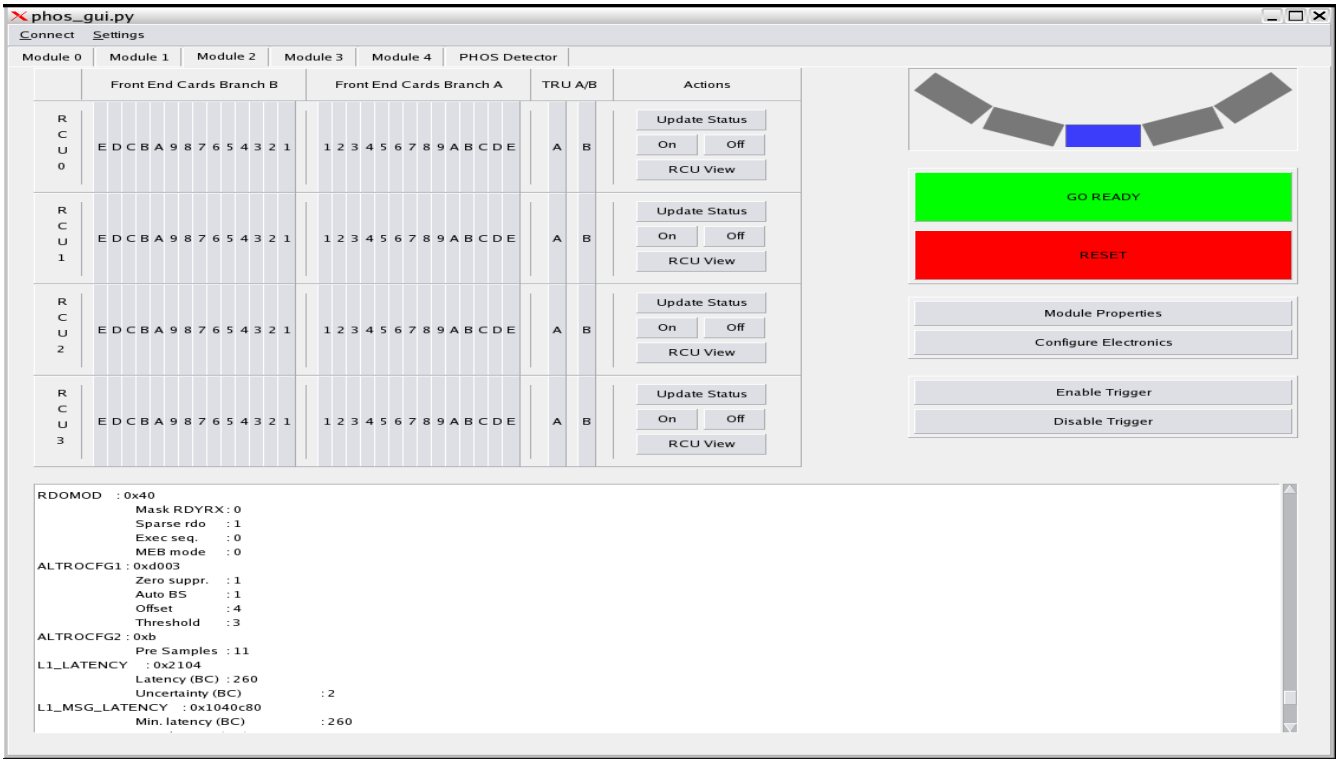
> ssh phs@alidcscom075

No password has to be given. At alidcscom075, go to the directory /home/phs/phos_dcs/bin and start the gui:

cd phos_dcs/bin

. startgui.sh

The following window should appear



Before one can do anything with it, one has to connect to the RCUs. To define which RCUs to connect to, do connection --> Connection Settings. Then do connection --> Connect now.

The gui shows the status of one module at the time. To select module, use the buttons at the top Module 2, Module 3, and Module 4.

When the gui starts, all cards appear grey. To find out the status, one should click “Update status”. The color will change to White (Off), Green (On), Red (Error), or Black (no connection). **Note: This should never be done during a run!**

The buttons “On” and “Off” turn on/off all FEE cards on one RCU. Individual FEE cards can be turned on/off by clicking on the FEE card. The “Go Ready” button cofigures the electronics and disables, enables trigger. The “Reset” button resets the electronics, for example if PHOS goes busy. It should be followed by “Go Ready”.

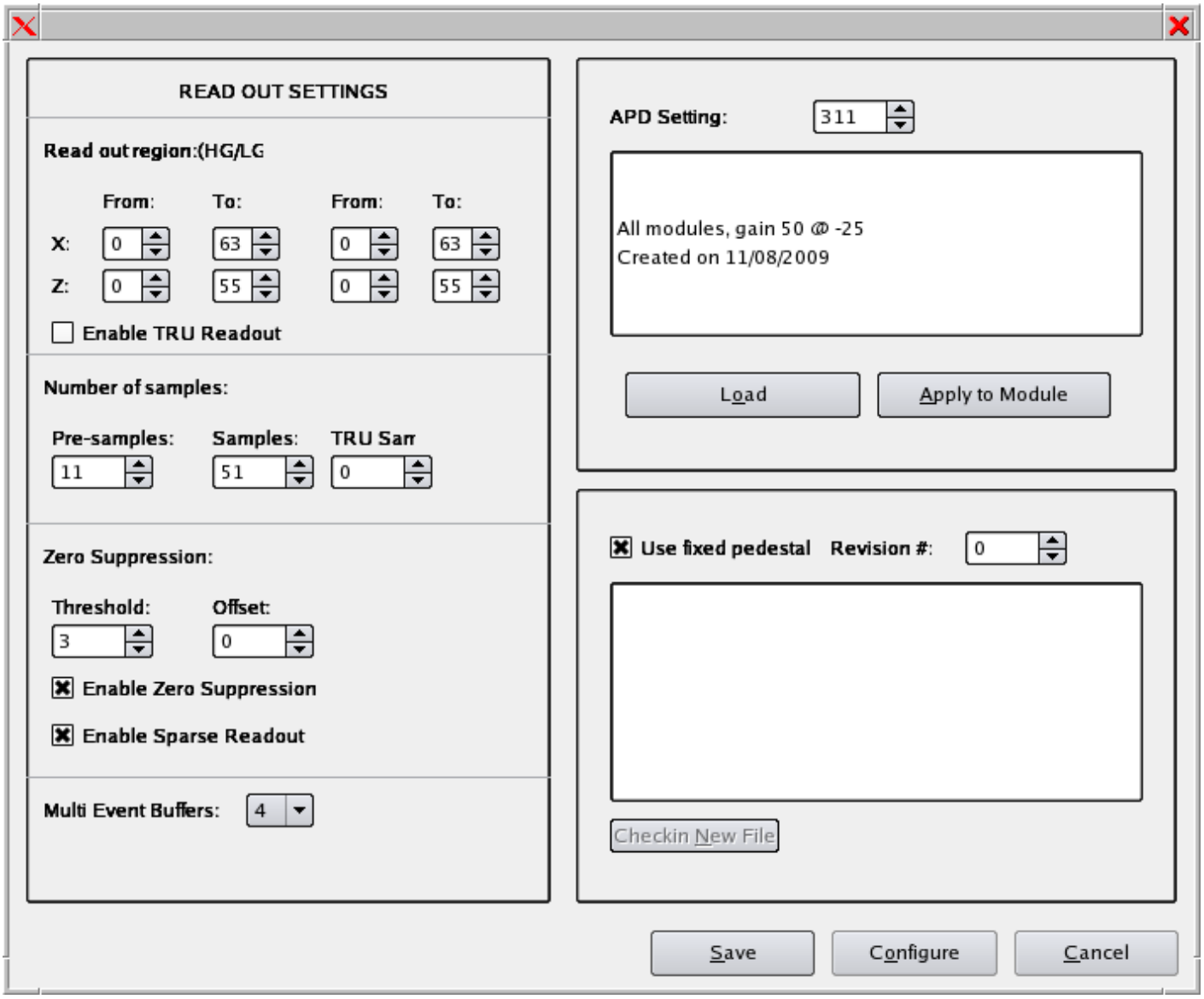
The configuration settings can be modified by clicking Configure Electronics. The window on the following page will appear. One can select the configuration options (ZS on or off, mode for subtraction of pedestals, number of samples etc.) The same window is used to load the APD settings.

NOTE: One should never do anything with the phos_gui when a run is ongoing. Not even clicking Update Status.

The reason for this is that the information to and from the phos_gui goes on the same data bus as the real data.

If the phos_gui hangs, one can exit by pressing Ctrl-Alt-\ (Ctrl-Alt-backslash).

If there are problems connecting to some RCUs, check that the FEE servers are running using did, see p. 15.



The phosgui window for setting the configuration.

2. Basic Operation

The normal state of PHOS during running (cosmics or collisions) is to have all Low Voltage (LV) and High Voltage (HV) channels on. The FEE cards should be on and the electronics should be configured. The PHOS shifter should make sure that this is the case and correct any upcoming problems. If a problem cannot be solved, the PHOS OnCall shifter should be called.

Note: ***The HV should never be on without the LV also being on.***

If something appears to be seriously wrong or the PHOS HV have to turned off quickly for some reason, there is a simple button for moving PHOS into SAFE mode:

Moving PHOS into SAFE mode (emergency button)

- Click Right Mouse (RM) on **17 PHS Go Safe** → go to red,
- then within 10 seconds click Left Mouse (LM) button and all PHOS will be in safe mode, which means:

HV will be switched off,

Cooling, LV, LED, FEE will not change their status.

Instructions for PHOS On Call

The PHOS On Call should be reachable by phone 24 h per day. He/she should be able to reach Point 2 within 30 min after a call. People who are On Call should be registered as “phos experts” in PVSS. This is necessary for being able to turn on and off the HV and LV. Here are some points to follow

1) Be aware of what is going on at Point 2 and what the plans are for PHOS. Follow the e-mails on the alice-p2info mailing list, stay in contact with the PHOS Run Coordinator and the ALICE shift leader etc.

2) Make sure that PHOS is ready to take part in global runs when it should.

3) Monitor the quality of the data. Use the logbook to check the PHOS event size. It can be found by clicking on a run in the logbook and then clicking on “Run Statistics” The event size (in pp collisions) should be between 8.5 and 12.5 kByte per event. Deviations from this indicate problems. Either noise (too large event size) or that some part of PHOS are not read out (too small event size). One can see the amount of data recorded by each LDC by clicking on “LDC statistics”. Also check the DQM plots in the logbook. These can be found by first clicking on a run and then clicking DQM. An example plot is shown below. There should be entries for all 3 modules (2-4) in the first two histograms. The number of hits don't have to be the same. The number of hits is normally largest in Module 2 and smallest in Module 4. The following 6 plots should all have entries. The mean and RMS should be compatible with the example below. Sorry that this perhaps is rather vague, but more precise criteria for good vs. bad runs are not yet available. The DQM plots are monitored online by the DQM shifter, but an extra cross check should be done. These checks should be done at lest once per day when there is Physics data taking. There are also QA plots in HLT that can be consulted during a run.

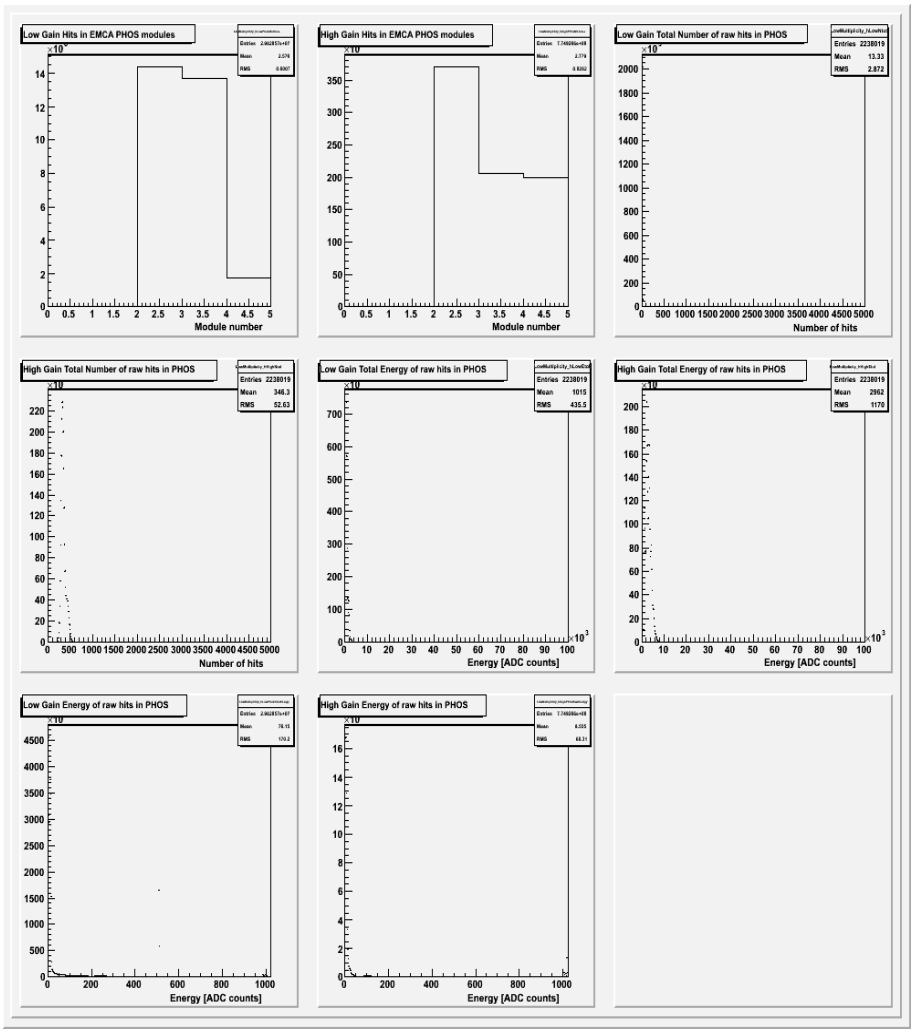
4) Take pedestal and LED runs when needed. Given the stability we have observed it is sufficient to do this once per week.

5) It is recommended that each On Call subscribes to the phos-alarm@cern.ch mailing list. This can be done from here

http://www.cern.ch/groups.

You will then get an e-mail when a software or hardware interlock is triggered.

DQM Plots for PHOS from the logbook for a good pp run:


Low Gain Hits in EMCA PHOS modules
Module number
High Gain Hits in EMCA PHOS modules
Module number
Low Gain Total Number of raw hits in PHOS
Entries 2238019
Mean 13.33
RMS 2.872
Number of hits
High Gain Total Number of raw hits in PHOS
Entries 2238019
Mean 346.3
RMS 52.03
Number of hits
Low Gain Total Energy of raw hits in PHOS
Entries 2238019
Mean 1015
RMS 435.5
Energy [ADC counts]
High Gain Total Energy of raw hits in PHOS
Entries 2238019
Mean 2962
RMS 1170
Energy [ADC counts]
Low Gain Energy of raw hits in PHOS
Energy [ADC counts]
High Gain Energy of raw hits in PHOS
Energy [ADC counts]

How to solve some common problems

If PHOS goes busy during a global run, has a CDH error, or has stopped a run because of an event size > 2 MB

If ECS/DAQ calls and says that PHOS is busy, has produced CDH errors, or has an event size > 2 MB, the following procedure should be followed:

1. If the phosgui is not running, log on to alidcscom075 (ssh phs@alidcscom075) and start it. See p. 5- 7.
2. In the phosgui, click connect → connect now.
3. For each module, Click “Reset” then Click “Go Ready”.
4. Tell DAQ/ECS that PHOS is ready.

If PHOS continues to be busy, check with DAQ that the right LDCs are selected. See below. If the problems persist, call the PHOS OnCall or one of the people listed on the first page of this manual.

Association of DDLs with LDCs

To find which module a certain LDC/DDL belongs to, here is the mapping between LDCs, DDLs and modules (see also Appendix D):

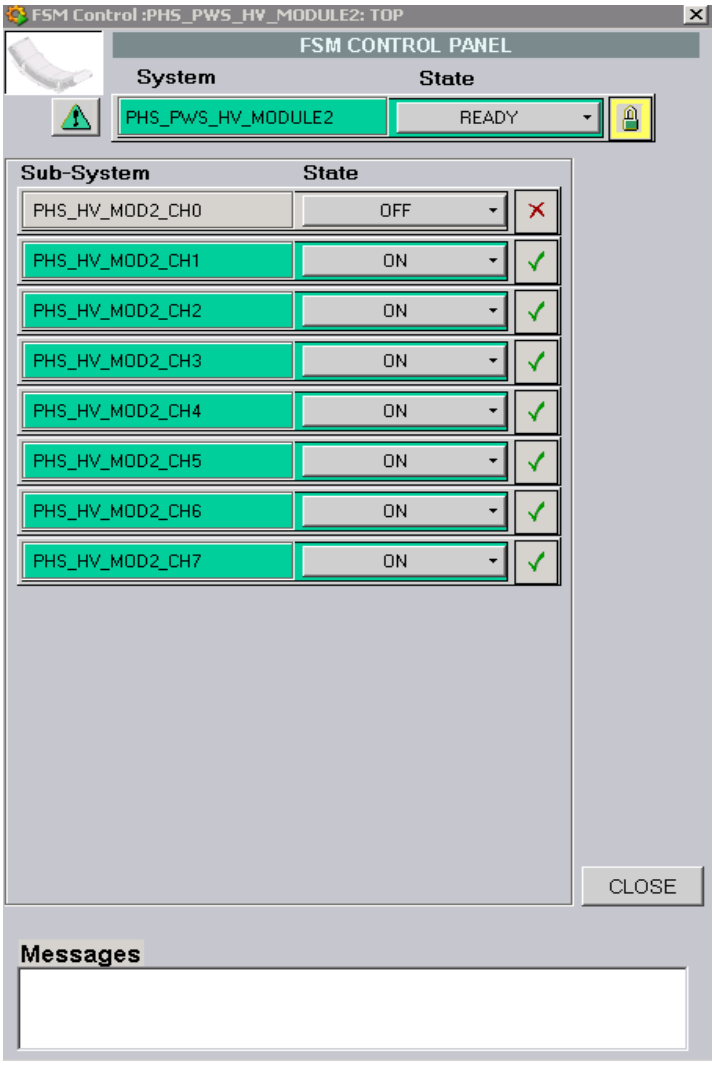
Module 2:	LDC: M3-00-01	DDLs 1800, 1801
	LDC: M3-02-03	DDLs 1802, 1803
Module 3:	LDC: M4-00-01	DDLs 1804, 1805
	LDC: M4-02-03	DDLs 1806, 1807
Module 4:	LDC: M5-00-01	DDLs 1808, 1809
	LDC: M5-02-03	DDLs 1810, 1811

If all modules should be read-out, all these should be included. If only one or two modules should be read-out, then only the corresponding DDLs / LDCs should be selected.

If one or several HV Channels trips

Only people who are registered as PHOS expert in PVSS can do this. Others have to call the PHOS OnCall.

Open the FSM Control panel for the HV of the relevant module, module 2 in this case. To get it, open PHS_PWS --> PHS_PWS_MODULE 2 --> PHS_PWS_HV_MODULE2. The panel is shown below:



The top rectangle should be red if there was an error. To ramp down the voltage, click on the to rectangle and do reset_emerg. This is a fast ramp down. (If one clicks reset, the color might change to green. If that happens, click again and select go off.)

When the voltage is down, the 13 V for that module should be switched off and on again. Open the PHS_PWS_LV_MODULE_**N** to do that. The 13 V channel is labeled PHS_PWS_WIE195_CH0/CH4/CH2 for Module 2,3,4, respectively.

When the 13 V has been turned on again, the APD settings should be loaded. How to do this is explained under 6) in the procedure for a Power Cycle (p. 23).

Before ramping up, the ramping settings may have to be modified. Go to PHOS Monitoring zone (5 in Fig. 2), and click on High Voltage for the appropriate module. Click on settings. If the ramp is not set to 0.1 V/s, change it. Type “0.5” in the square Ramp and hit return. Then click set. Check that the readback value is changed to 0.1 V/s (yes, 0.1 V/s - not 0.5!). The voltages should be 395 V for Modules 2 and 3 and 350 V for Module 4. These are the default values. and should not have to be changed.

Then go back to the PHS_PWS_HV_MODULE_**N** and click on the top rectangle and select Go Ready. The ramping takes about 30 mins.

If channels trip repedetly, the HV should be turned off and an expert called.

If one or more LV channels trip:

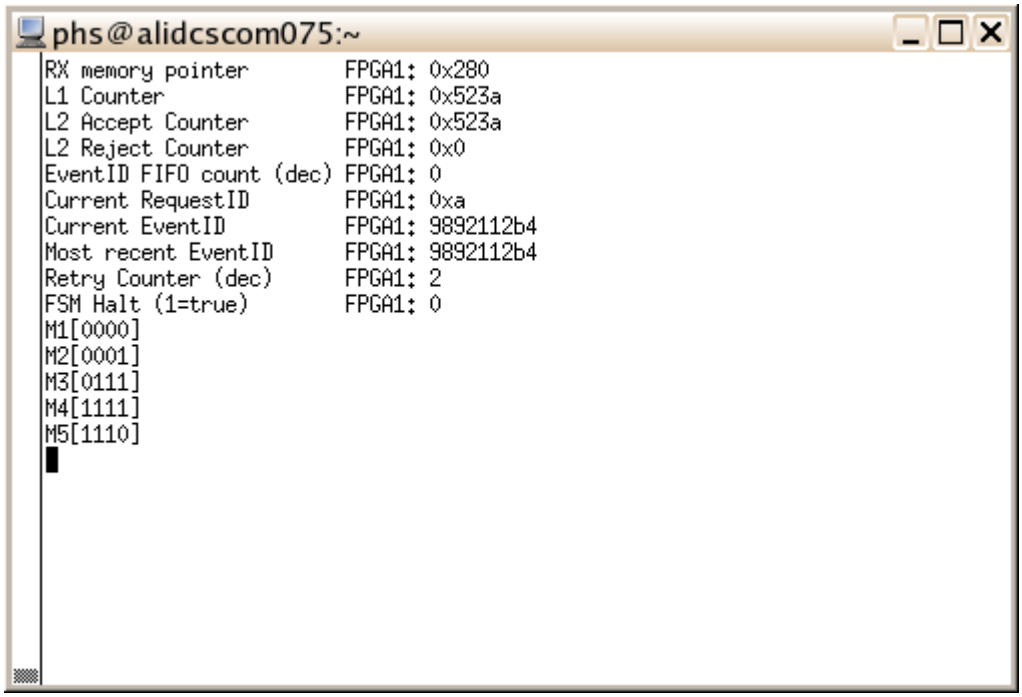
This is unusual. If it happens, an interlock should turn off the HV. If the HV is not turned off, turn it off manually. Then follow the procedure for “cold start” below.

If an interlock is activated:

Call an expert. Try to understand what caused the interlock to be activated. If it is not understood, don't do anything. To reset the interlock, click on “Software interlocks” in the MUI.

Monitoring the busy box:

The busy box window is shown below.



As events are coming in, the (hexadecimal) numbers following the L1 Counter and L2 Accept Counter should increase. The busybox is reset at the beginning of every run, so it is normally not necessary to reset it manually. To reset it manually, one should log in to alidcsdcb1557. This is done by the command bb from alidcscom075. Then go to the directory /mnt/dcbrw/busybox_files and execut the following command “. reset_phos_bb.sh”

The busy box settings are defined in the file

/nfs_export/dcbrw/busy/busybox_files/bbinit_phos.sh

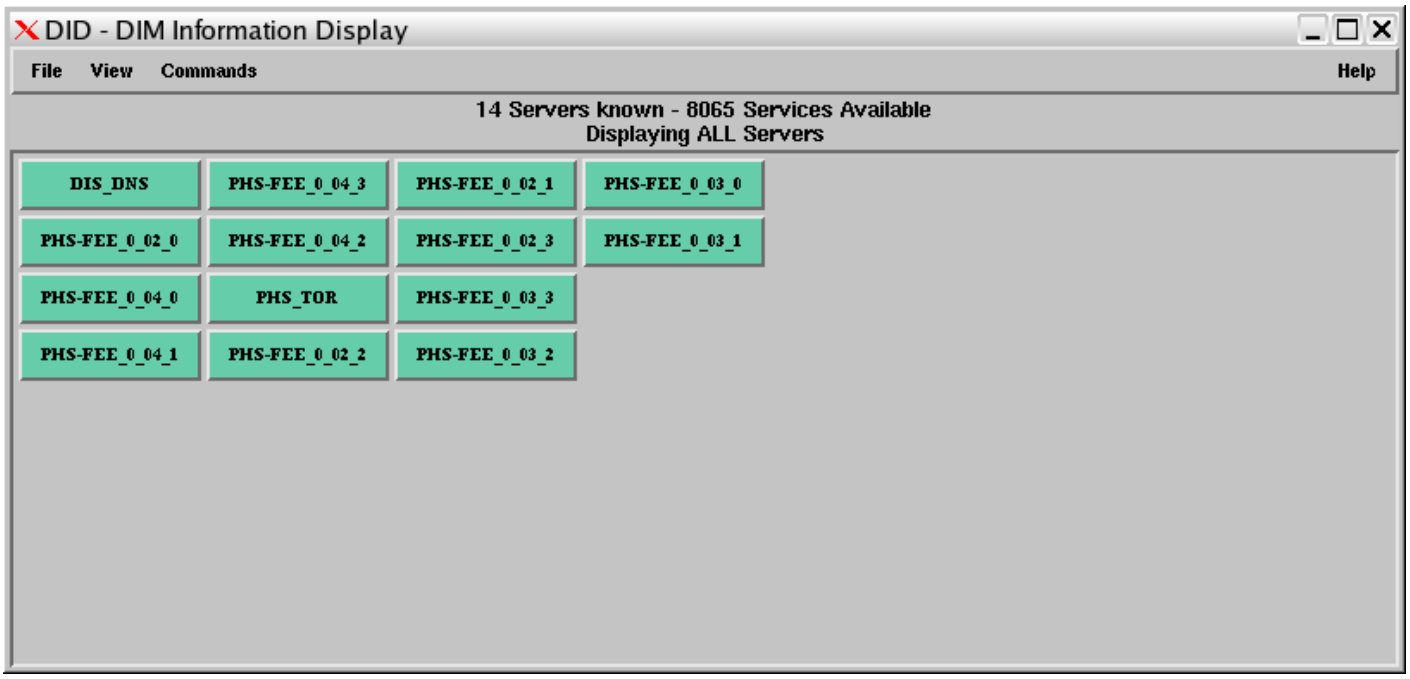
Checking the FEE Servers using did

If the did window is not running, it can be started from alidcscom075.

ssh phs@alidcscom075

did

Click View --> All Servers. The window is shown below



There should be 16 buttons in this window. One DIS_DNS. One PHS_TOR. One PVSSSys91Man1::DIMHandler (not in Fig. above). One ztt_dimfed_server (not in Fig. above). 4 buttons for each module, PHS-FEE_0_0[2/3/4]_[0/1/2/3]. The first number indicates the module. If any of the PHS-FEE_0_0[2/3/4]_[0/1/2/3] buttons are missing, it means that the corresponding FEE servers are not running. To restart them, go to the directory /home/phs/bin on alidcscom075 and run the script all_phos_dcs_m2_reboot.sh to reboot the FEE servers for module 2. The “m2” is replaced by “m3” and “m4” for modules 3 and 4, respectively. The PVSSSys91Man1::DIMHandler and ztt_dimfed_server are only there if the intercom layer is running.

If the DIS_DNS button is missing one should execute /usr/local/dcs/dim/linux/dns on alidcscom075.

3. Global runs

Before PHOS can particiapte in a global run, the DCS and DAQ locks should be released from aldaqacr48 and 49. The locks will be taken by the global DCS and DAQ shifters. Don't change the configuration or do anything with the phosgui when a global run is ongoing.

Before PHOS is handed over to global control, it should be checked that the detector is in good shape. A standalone run should be taken and there should be no errors. The event size for empty events should be consistent with Appendix F.

4. Standalone runs (Pedestal/LED)

Before starting, the control of the DCS and DAQ locks should be taken. Ask the shiftleader to release the locks if necessary. Make sure that all LV and HV channels are ON and that the phos_gui is running. If it is not running, log on to alidcscom075 and start it:

```
ssh phs@alidcscom075
cd phos_dcs/bin
. startgui.sh
```

Connect to the RCU/FEE cards by clicking Connect --> Connection Settings and select the RCUs to be read-out. Then click Connect --> Connect Now. Check that all FEE cards are ON. If they are not ON, check next section (“Cold start”) on how to turn them ON.

Select the number of pre-samples, samples, Zero-suppression (enable/disable), Sparse read-out (enable/disable) according to the type of run. This is done by clicking on Configure Electronics in the phos_gui. In the Configure Electronics window

- Select number of pre-samples and samples, Zero-suppression (enable/disable), Sparse readout (enable/disable), threshold and offset (if applicable).
  - For pedestal run, select zero-suppression OFF and sparse read-out OFF. Select 11 presamples and 51 samples. **Do not set the threshold to 0.**
  - For LED run, select zero-suppression ON (threshold 3, offset 0) and sparse-readout ON. Select 11 presamples and 51 samples.

- Click Save and then Cancel.
- For each module, click “Go Ready”.

The configuration is done when information stops flowing in the alidcscom075 window.

PHOS is now ready to take data. To take a pedestal run, proceed to start data taking. For a LED run, the LED system should be started now.

This is done in the following way:

In top level DCS control, click the button PHS_DCS_RUN (the lowest one) and choose the command “CONFIGURE”. In the window that appears, write “LED” in the space Value and click Send. This will start the LED system. In the Main GUI, the square LED flash at **11** should change from blue to green and the run type will change to LED.

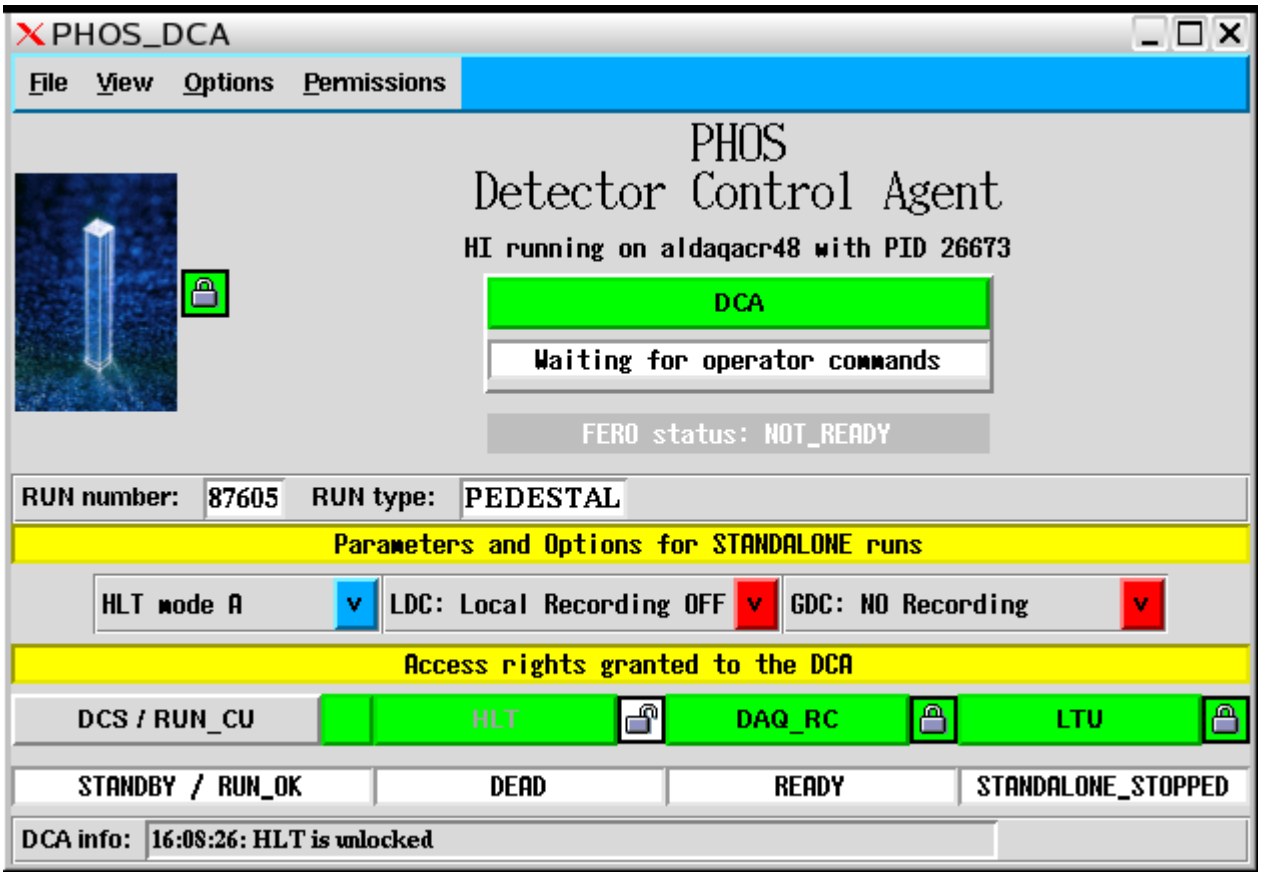
By default, the LED configuration will be 2554. To use a different one, open the LED-panel by clicking on LED at **5** in the Main GUI. Type the configuration at the top and select which modules to activate. Then proceed as above to start the LED system.

After finishing the LED run, you should click on the PHS_DCS_RUN button in the top level DCS control and select the command “CONFIGURE”. Type PHYSICS (or PEDESTAL) and click Send. The LED system will deactivated. The square LED flash at **11** in the Main GUI should change from green to blue and the run type will change to what is selected.

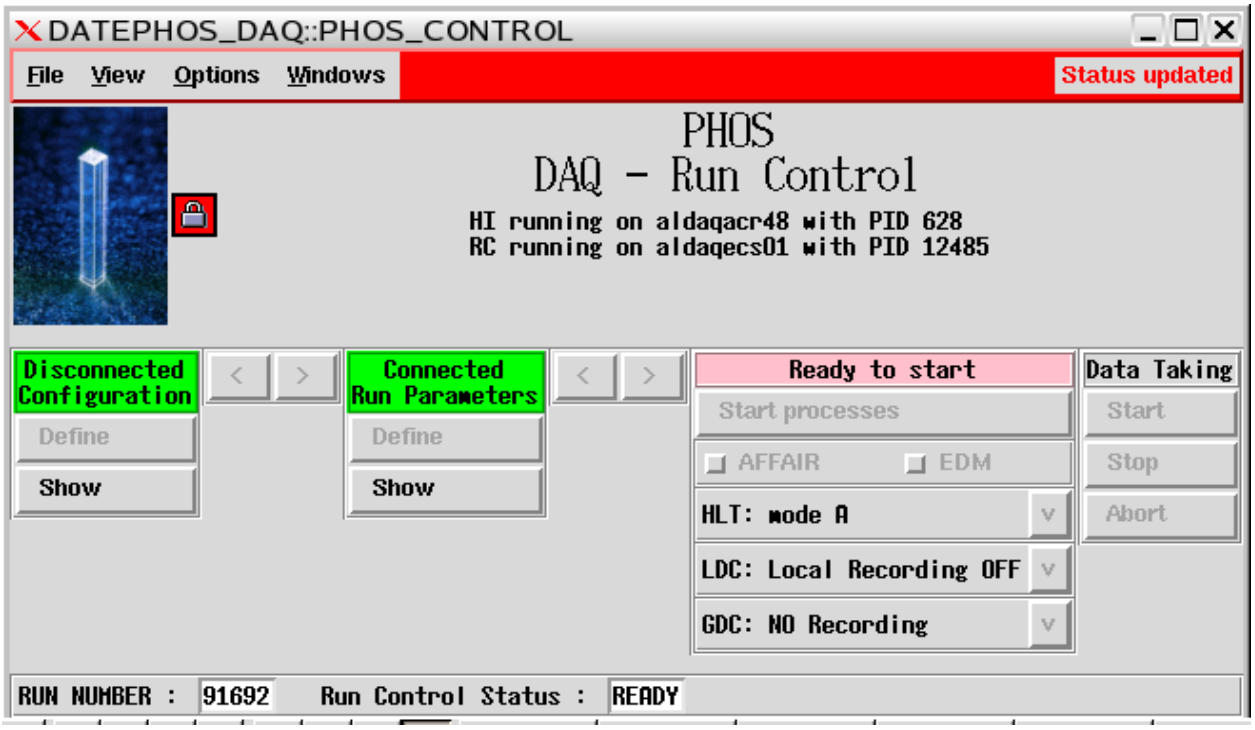
REMEMBER TO SWITCH OFF THE LED SYSTEM BEFORE STARTING ANY OTHER TYPE OF RUN.

Start data taking

If the DAQ window (PHOS_DCA) is not open, open it by clicking on the 6th icon from the left in the lower panel (it's an Emacs icon and when the mouse hovers over it, it should say DateHI; if there is no lower panel, do ctrl-alt-enter and it will appear). Choose PHOS.



If the padlock is red, ask the ECS operator to release DAQ control. Then click on the padlock and lock it. It should then be green, as in the figure above. Unlock the DAQ_RC padlock. Click on view --> Show DAQ Control to open the DATEPHOS_DAQ gui.



Lock the main padlock in this window (DATEPHOS_DAQ). Then, click the ">" arrow following "Disconnected Configuration". Then click the ">" Following "Connected Run Parameters". Unlock the padlock in this window.

Note: If one has to change which ddls that should be read-out, it can be done as follows (but this is something which should normally not be done by the shifter, more details are in the expert manual): click Define under "Disconnected Configuration", then choose Detector, then choose PHOS. Select the LDCs that should be read-out. In the (small) ALICE DAQ window, click select equipment and mark the desired DDLs and click Commit. Login to alidcscom075 and go to /nfs_export/dcbrw/busy/busybox_files. Check that the right RCUs are included / commented out in the file bbinit_phos.sh.

Go back to the PHOS_DCA window. Lock the padlock DAQ_RC. Unlock the HLT padlock. The DCA frame should be green. Click on it to start a Pedestal or LED run.

When the run has started a new window will appear (PHOS). The number of events is shown under the LDC status display (number of subevents recorded).

To stop the run, click on DCA and select stop_datataking. It is recommended to run about 100 events for Pedestals and 10,000 events for LED runs.

To start the transfer of data to alien, click on “File” in the PHOS_DCA window and select Start migration of data to Castor.

To release DAQ control, click on DCA and select “Release Resources”, then unlock the main padlock in the PHOS_DCA window.

5. Switching on/off Power Supplies, “cold start”

Note: The HV should never be ON when any LV channel is OFF!

Switching OFF power should be done in the following order

1) Ramp down the HV.
2) Turn OFF the FEE cards from the phosgui.
3) Turn OFF the LV (all channels, incl. 13 V).

Switching ON power should be done in the following order (note that this procedure normally takes 2-3 hours)

1. Switch ON LV and program the RCUs.

   For Module 2

   i) Switch ON the first 5 LV channels (not the 13 V).

   ii) Program RCU 84-87.

   For Modules 3 and 4

   i) Switch ON the first 2 LV channels (not the 13 V).

   ii) Program all the RCUs, 92-95 and 88-91.

   iii) Switch ON the remaining 3 LV channels (not the 13 V).
2. Open the phosgui and connect to all modules. Click “reset” and “go ready”.
3. Do a test run and check that there are no CDH errors.

(To be able to do a run before the HV is ON you have to exclude the PHS power supply in the dcs: PHS_PWS_TOP ->exclude)

4. Turn ON the FEE cards.
5. Turn ON the 13 V LV channel.
6. Load and apply the APD settings.
7. Configure electronics.
8. Turn ON HV.
9. If the TRUs should be read-out, they can be turned ON and configured now.

More details on how to Switch ON power:

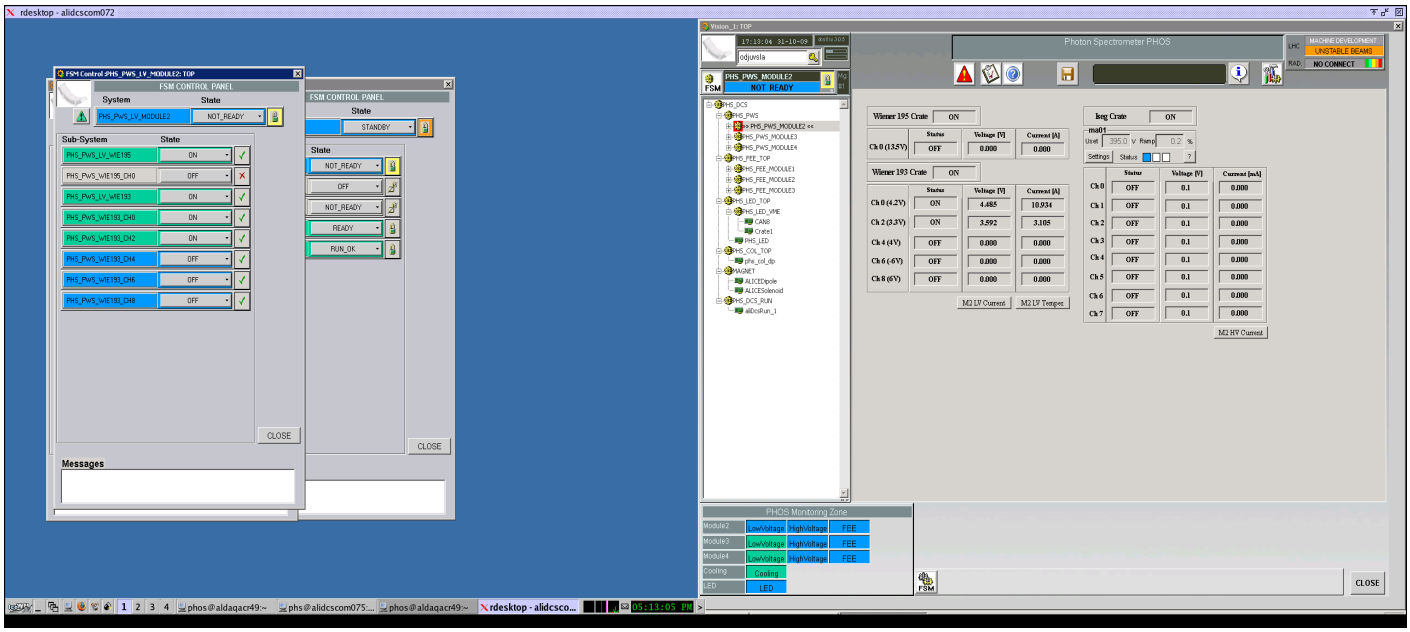
1) Switch ON LV and program the RCUs

Note that there are different procedures for how to switch on the LV in Module 2 and Modules 3+4, respectively.

The Low Voltage (LV) is handled by the Main User Interface (MUI). To open the LV controls, click on PHS_PWS --> PHS_PWS_MODULE 2 --> PHS_PWS_LV_MODULE2 for LV of Module 2, and similarly for Modules 3 and 4.

For Module 2:

Select the 5 lowest channels WIE193_CH0, _CH2, _CH4, _CH6, _CH8 as shown in the figure below.



Use the upper button and select “Go Ready” to turn these channels on. Note: all channels should be selected and turned on simultaneously using the top button; don't turn on each channel separaterly.

Program the RCUs by logging on to alidcscom075 (ssh phs@alidcscom075). Go to the directory /home/phs/bin and run the script

> program_rcu_171109.sh [RCU]

where [RCU] should be 84, 85, 86, and 87.

Note: It sometimes happens that programming the RCUs trips the LV. If this happens repeatedly, one can first turn on channels WIE193_CH0, _CH2,_CH6, _CH8 (i.e. all except _CH4) and program the RCUs, and turn on the WIE193_CH4 afterwards.

For Modules 3 and 4:

Select the first two LV channels (not the 13 V). These are WIE191_CH0, WIE191_CH2 for Module 3 and WIE190_CH0, WIE190_CH2 for Module 4. Use the upper button and select “Go Ready”.

Program all the RCUs on these two modules. Log on to alidcscom075 (ssh phs@alidcscom075). Go to the directory /home/phs/bin and run the script

> program_rcu_171109.sh [RCU]

where [RCU] should be 92, 93, 94, 95 for Module 3 and 88, 89, 90, 91 for Module 4.
Go back to the LV control window and select the remaining 3 LV channels (not the 13 V). These are WIE191_CH**(4,6,8**) and WIE190_CH(**4,6,8**) for modules 3 and 4, respectively. Turn the channels ON using the upper button and select “Go Ready”.

2) Start the phos_gui if it is not already running. To do this, log on to alidcscom075 and go to the directory /home/phs/phos_dcs/bin and enter

> . startgui.sh

For more info on the phosgui, see p. 5-7. In the phos_gui, connect to all modules. Then click “Go Ready” for each module.

3) Do a test run and check that there are no CDH errors. How to do this is explained in the previous section “Standalone runs” under data taking. Take a pedestal run and check that at least 30 events are collected. Check the infoBrowser for CDH errors. If there is a CDH error, check which DDL produced it and restart the corresponding Module (go back and repeat steps 1-3). If the module cannot be identified, all modules should be restarted (repeating steps 1-3). If after 3 attempts there are still problems, contact an expert.

4)The FEE cards are turned ON using the phosgui. If the phos_gui is not already running, log on to alidcscom075 and go to the directory /home/phs/phos_dcs/bin and enter

> . startgui.sh

For more info on the phosgui, see p. 5-7.

Turning on the RCUs should be done one module at the time.

- Click connect --> connection settings.

- Select the DDLs for one module.
- Click connect-->connect now.
- Click reset.
- To turn on the cards in one RCU, click “ON” in the phosgui (but check below for execptions for RCU2 in Module 3 and RCUs 0 and 3 in Module 4).

Repeat the steps above for all 3 modules. If the phosgui crashes, it can be restarted and the FFEs/RCUs that were turned ON will remain ON. To check which RCU/FEE that are ON use Update Status and continue to turn on the RCUs.

Note: Some of the RCUs and FEE cards in Module 3 and 4 require special attention.

For Module 3, RCU 2, turn ON the FEE cards in Branch A by hand, i.e. click on each card one at the time. The cards should turn green. Don't do anything with the cards in Branch B.

For Module 4, RCU0, turn ON the FEE cards in Branch A by hand, i.e. click on each card one at the time. The cards should turn green. Don't do anything with the cards in Branch B. For Module 4, RCU3, turn ON all FEE cards *except card 7 and card A in Branch A* by hand.

5) To turn ON the 13 V, go back to the LV window on alidcscom072. Enable channel WIE195_CH0 (for Module 2) and click “GO READY”. For Module 3 and 4, the corresponding channels are WIE195_CH4 and WIE195_CH2, respectively.

6) To load APD settings, go back to the phosgui and select one module. Then click Configure Electronics. In the new window

- Select APD settings – The default is 311 for all modules (gain 50 at -25 C).
- Load.
- Apply to module (wait).
- status = 1 = SUCCESS should be seen in the bottom frame of the phos_gui (it might be

needed to scroll up to see this).
- click cancel .

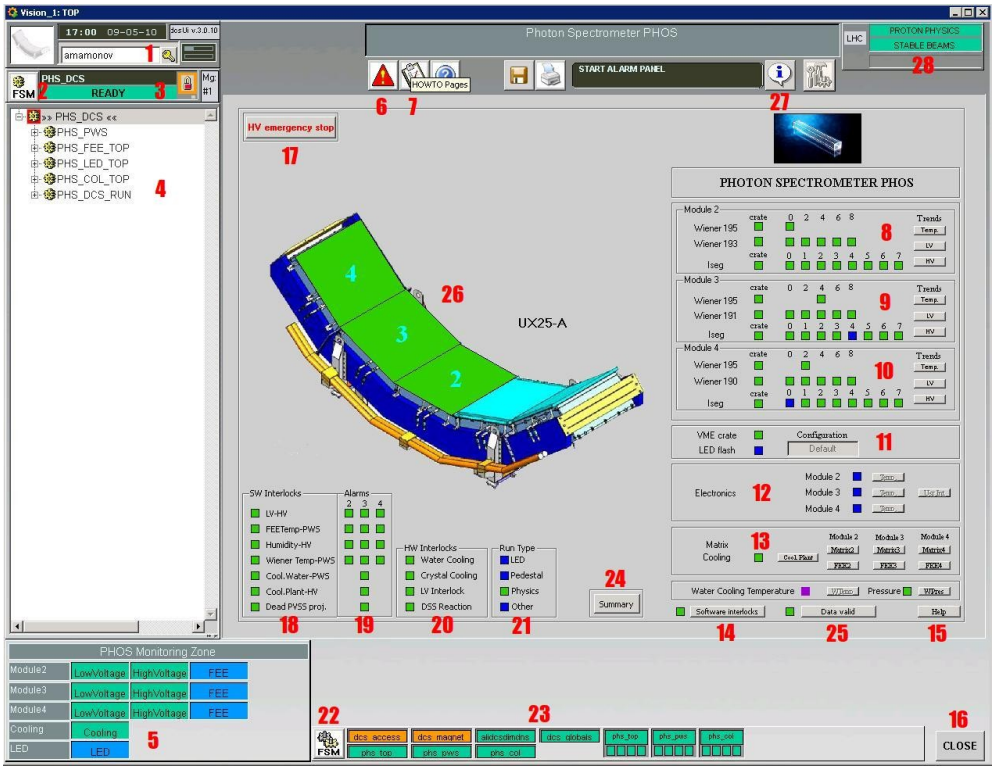
Repeat the above for all 3 modules. Note that this may take up to 5 min per module.

7) Configure electronics. This can be done for all modules at the same time. Go to the phosgui and click connection --> connection settings and select all modules. Click connect --> connect now. Click configure electronics. In the Configure Electronics window

- Select number of pre-samples and samples, Zero-suppression (enable/disable), Sparse readout (enable/disable), threshold and offset (if applicable).
  - For pedestal run, select zero-suppression OFF and sparse read-out OFF. Select 11 presamples and 51 samples. **Do not set the threshold to 0.**
  - For LED run, select zero-suppression ON (threshold 3, offset 0) and sparse-readout ON. Select 11 presamples and 51 samples.
  - For global (cosmics, collisions) runs, select zero-suppression ON (threshold 3, offset 0) and sparse-readout ON. Select 11 presamples and 51 samples.
- Click Save and then Cancel
- For each module, click “Go Ready”.

8) Turn ON HV. This is done from the MUI: PHS_PWS --> PHS_PWS_MODULE 2 --> PHS_PWS_HV_MODULE. (The panel is shown on p. 12). Enable all channels and select “GO READY” in the top buttom. The ramping takes about 30 mins.

APPENDIX A: Description of the Main User Interface (MUI)



Top left-hand corner:

1 User access window – for users' logins.

2 FSM-button (Finite State Machine) – Top level of DCS control – for controlling LV, HV (Power Supply - PWS), LED, FEE, Matrix Cooling Machine, Run Control Unit (in order to choose the type of run).

Press **FSM** button to begin the process of controlling.

3 (PHS_DCS) - Info-window – describes the state of the system.

Left side:

4 <<PHS_DCS>> - the hierarchical tree of subsystems.

Bottom left-hand corner:

5 PHOS Monitoring Zone – quick access to the info about the state of the systems.

Top:

6 Alarm –current alarms information.

7 Manual - PHOS DCS Manual – 2007 ([1]).

Right side:

8 ÷ 10 - Indicators of PWS system state for 2, 3, 4 PHOS modules.

11 - Indicators of LED monitoring system state.

12 - Indicators of FEE electronics system state (which is now in progress).

13 - Indicators of Matrix Cooling system state & Temperatures and Humidity.

14 - Software Interlocks – Software Interlocks status.

15 - Help – general information about the status' colours.

Bottom right-hand corner:

16 - Close - in order to close the Main User Interface.

To start MUI once more after closing - **Start → PHOS**

Top center:

17 - PHS Go Safe – Moving all the PHOS modules to safe mode (turning off all HV channels).

Bottom:

18 - 19 - SW (Software) Interlocks and their Alarms.

20 - HW (Hardware) Interlocks.

21 - Run Type.

22 - FSM – (fig.5) Stop/Start/Restart of all FSM - **ONLY IN THE LAST RESORT!!!**

23 - ALICE DCS monitoring zone – is in progress

24 - DCS summary panel (see App.H, fig.16)

25 - Data Valid panel – give the information about interlocks and alarms.

You should wait ~ 1 min before information will arise.

26 - PHOS modules general status;

27 - Message sender to other detectors;

28 - LHC Beam general status.

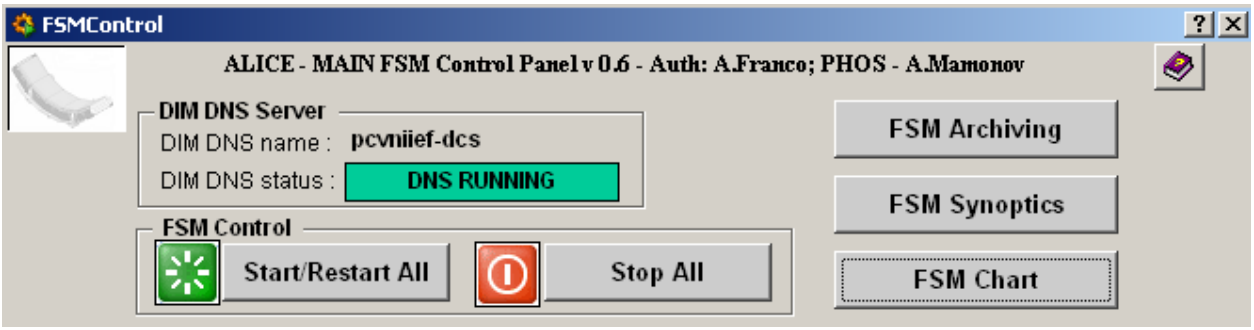


Fig.4 - PHOS FSMs Control Window, it appears after clicking LM on **22 - FSM**

Other buttons are not ready yet.

For more details – click on 7 (PHOS Detector Control System Manual -2007([1])).

……

<u>The status colours</u>

Dark blue - system is not ready, switched off or is in standby state; HV/LV is off.

Yellow - system is in the intermediate state (ramping, cooling etc.).

Orange - no connection with the device.

Green - system is ready to work; HV/LV is on.

Red – an error or an incorrect operation of the device or system of devices.

15 - Help – displays general information about status colours.

<u>Getting info</u>

- **T°, LV, HV currents over time**-zone **8 ÷ 10** Trends, **Temp. , LV , HV** or zone **5**
- **Matrix Cooling, Water Cooling Pressure** - zone **13** or zone **5**
- **LED** - zone **11** or zone **5**
- **Devices status** – zone **4 –** LM button, then RM button → View.

How to start the MUI manually

Click Start → PHOS - to start **MUI** manually – fig.3).

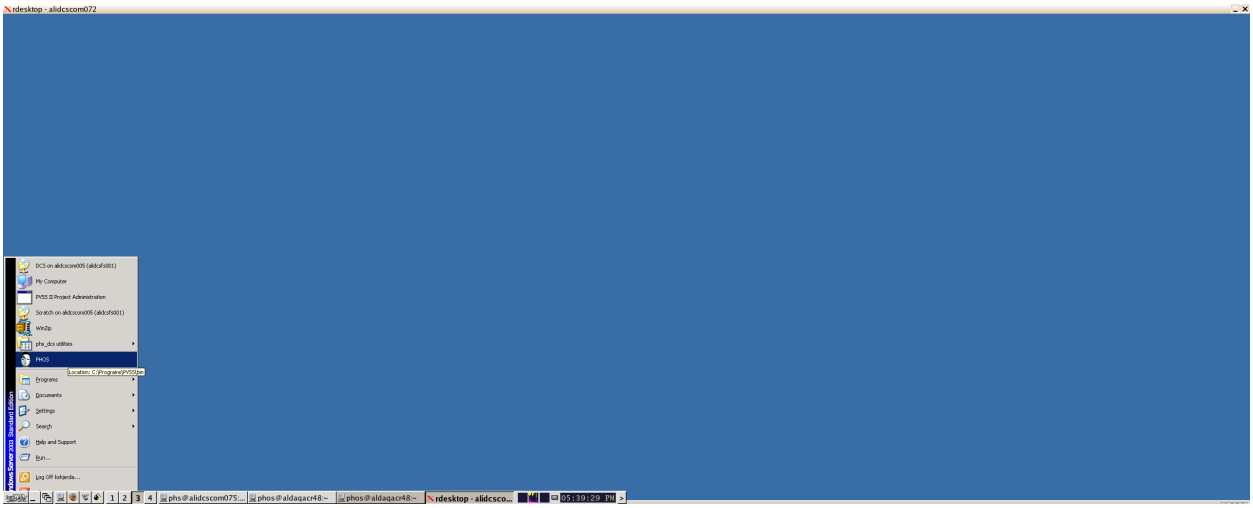


Fig.3

For automatic MUI start put **D:\Shortcut to PVSS_startup_file.bat**

into the **Start/Programs/Startup** folder.

1) Then you should be authorized once more by entering your NICE login and password into PHOS DCS access window (fig.4)

NICE login

NICE password

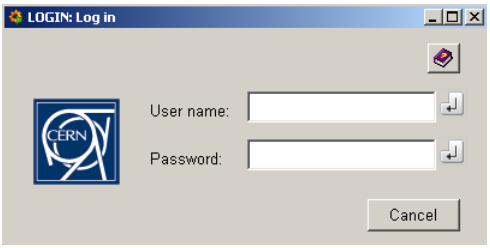


Fig.4

APPENDIX B: The DCS Padlocks

DCS Padlocks

Padlock is unlocked – it means that the control is free, and anyone can take over.

To take control - (LM button - TAKE)

To release control - (LM button - RELEASE_ALL)

Padlock is locked – it means that the system is under control.

In yellow frame – something excluded – control over part of the system.

In orange frame - something excluded – control over part of the system and/or shared control.

Green – only we have control.

Blue – we share control with someone.

Grey - nobody has control.

Orange (red) – someone takes control.

Strikethrough – if this mark appears on any of the padlocks, even after you have taken control, the subsystem corresponding to this padlock will still be uncontrolled. In order to take over this subsystem unlock the padlock.

DAQ Padlocks

……..

APPENDIX C: The PHOS interlocks and alarms

Interlocks were made to save our detector in case of emergency state and/or incorrect operator reaction. In case of error the interlock switches the system into safe mode and informs the shifter.

1. HW-Interlocks

Water Cooling Plant Hardware Interlock.

Crystal Cooling Plant Hardware Interlock.

LV power crate Hardware Interlock.

DSS reaction on Hardware Interlock.

When an error occurs in any of these subsystems, all LV crates are blocking (switching off without the possibility to restart by the operator).

If any HW-Interlock is in action – the square changes colour

(zones 18 ÷ 20). Only ALICE DCS operators can unblock HW-Interlocks.

2. SW-Interlocks

LV-HV Interlock

If any PHOS module has HV without LV, interlock switches off the HV in emergency mode (50 V/sec) after 30 seconds delay.

FEE-Temp-PWS Interlock

If the temperature of any “warm” volume of the PHOS module is higher than 55 degrees Celsius, the interlock stops the HV of this module. If the temperature is equal to Dew Point Temperature, the interlock stops the HV of this module.

Humidity-HV Interlock

If the humidity in “warm” volume of the PHOS module is above 50%, interlock stops all HV (0.5 V/sec) for this module.

Water Pressure-PWS Interlock

If water pressure of FEE water cooling is more than 1000 mbar, the interlock stops all HV (0.5 V/sec) and then LV for all PHOS modules.

Cooling Plant-HV Interlock

If the Matrix Cooling Plant is in state of an error or does not respond for 15 minutes, the interlock stops all HV(0.5 V/sec) after 15 minutes delay.

If any SW-Interlock is in action, the appropriate square changes its colour (zones 18 ÷ 20).

3. Description of the PHOS alarms conception and recommendations for shifter's actions

Alarm system works accordingly with a rule that for some representative variables (like voltage, current, power, temperature, humidity, etc.) there are 3 consecutive thresholds after which the messages are generated for shifter to attract his/her attention that an error state is incoming. Mentioned thresholds are ordered with increase of danger levels. If the value of a variable exceeds the 1st threshold the message is classified as "**warning**", after exceeding of the 2nd threshold - "**alarm**" and, at last, at reaching of the 3rd threshold - "**danger**". An operator can see these messages with additional accompaniment of the description of needed actions.

The current list of alarms is as follows:

3.1. "Cold" volume temperature alarm for each PHOS module.

- **Warning**: +25°C ≤ t < +30°C; pay attention to the high temperature level inside the "cold" volume of PHOS module, check the state of the PHOS matrix cooling plant and the water cooling system.
- **Alarm**: +30°C ≤ t < +35°C; switch off the power of the alarmed PHOS module, check the state of the PHOS matrix cooling plant and the water cooling system, inform the PHOS Run Coordinator.
- **Danger**: t ≥ +35°C; immediately switch off the power of the alarmed PHOS module, check the state of the PHOS matrix cooling plant and the water cooling system, inform the PHOS Run Coordinator.

3.2. "Warm" volume temperature for each PHOS module.

- **Warning**: +35˚C ≤ t < +45˚C; pay attention to the high temperature level inside the "warm" volume of PHOS module, check the state of the FEE temperature sensors, PHOS matrix cooling plant and the water cooling system.
- **Alarm**: +45˚C ≤ t < +50˚C; pay attention to the high temperature level inside the "warm" volume of PHOS module, check the state of the FEE temperature sensors, PHOS matrix cooling plant and the water cooling system, inform the PHOS Run Coordinator.
- **Danger**: t ≥ +50˚C; switch off the power of alarmed PHOS module, check the state of check the state of the FEE temperature sensors, PHOS matrix cooling plant and the water cooling system, inform the PHOS Run Coordinator.

3.3. Humidity in the "cold" volume of each PHOS module.

- **Warning**: 70% ≤ h < 80%; pay attention to the high humidity level inside the "cold" volume of the PHOS module.
- **Alarm**: 80% ≤ h < 85%; pay attention to the high humidity level inside the "cold" volume of the PHOS module, inform the PHOS Run Coordinator.
- **Danger**: h ≥ 85%; pay attention to the high humidity level inside the "cold" volume of the PHOS module, inform the PHOS Run Coordinator.

3.4. Humidity in the "warm" volume of each PHOS module.

- **Warning**: 40% ≤ h < 50%; pay attention to the high humidity level inside the "warm" volume of the PHOS module.
- **Alarm**: 50% ≤ h < 60%; pay attention to the high humidity level inside the "warm" volume of the PHOS module, inform the PHOS Run Coordinator.
- **Danger**: h ≥ 60%; switch off the HV power of the alarmed PHOS module, inform the PHOS Run Coordinator.

3.5. Dew point temperature for each PHOS module (not implemented).

- **Warning**: the temperature inside the "warm" volume of the PHOS module is close to the dew point temperature (3 Degrees).
- **Alarm**: the temperature inside the "warm" volume of the PHOS module is close to the dew point temperature (2 Degrees), inform the PHOS Run Coordinator.
- **Danger**: the temperature inside the "warm" volume of the PHOS module is around or less than the dew point temperature, switch off the HV power for the alarmed PHOS module, inform the PHOS Run Coordinator.

3.6. LED VME crate.

- **Warning**: VME crate is off or doesn't respond, inform the PHOS Run Coordinator.

3.7. Cooling water pressure for all PHOS modules.

- **Warning**: 975 ≤ p < 985 mBar; pay attention to the high level of the water cooling pressure.
- **Alarm**: 985 ≤ h < 995 mBar; switch off the power for all PHOS modules, inform the PHOS Run Coordinator.
- **Danger**: h ≥ 995 mBar; immediately switch off the power of all PHOS modules in the emergency mode, inform the PHOS Run Coordinator.

3.8. Wiener LV temperature.

- **Warning**: 45˚C ≤ t < 55˚C; pay attention to the high level of the Wiener channel temperature.
- **Alarm**: 55˚C ≤ t < 65˚C; switch off the power of the PHOS module, where the alarmed LV Wiener channel presents, inform the PHOS Run Coordinator.
- **Danger**: t ≥ 65˚C; immediately switch off the power in the emergency mode of the PHOS module, where the alarmed LV Wiener channel presents, inform the PHOS Run Coordinator.

3.9 HV currents for each Iseg channel.

- **Warning**: 10 ≤ I < 12 mA; pay attention to the high level of the HV channel current of the Iseg HV power supply;
- **Alarm**: 12 ≤ I < 14 mA; be ready to get an error state because of the HV channel over-current, inform the PHOS Run Coordinator;
- **Danger**: h ≥ 14 mA; switch off the alarmed HV channel, inform the PHOS Run Coordinator.

3.10. Wiener LV device doesn't respond (not implemented).

- **Warning**: Wiener PL512 LV crate doesn't respond for 3 minutes, pay attention to the Wiener LV crate connection problem;
- **Alarm**: Wiener PL512 LV crate doesn't respond for 5 minutes, inform the PHOS Run Coordinator.

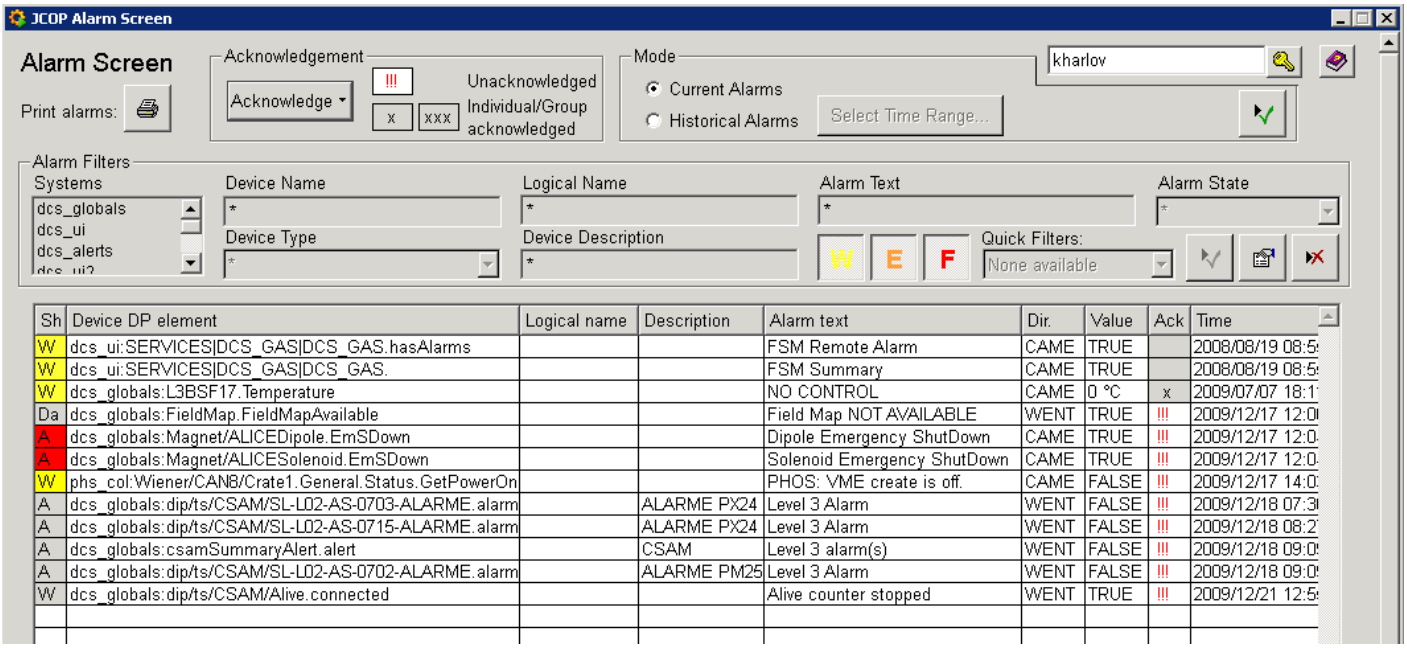
3.11. Iseg HV channel doesn't respond (not implemented).

- **Warning**: Iseg HV device doesn't respond for 10 minutes, keep the LV power for the alarmed PHOS module, pay attention on Iseg HV device connection problem;
- **Alarm**: Iseg HV device doesn't respond for 20 minutes, keep the LV power for the alarmed PHOS module, inform the PHOS Run Coordinator.

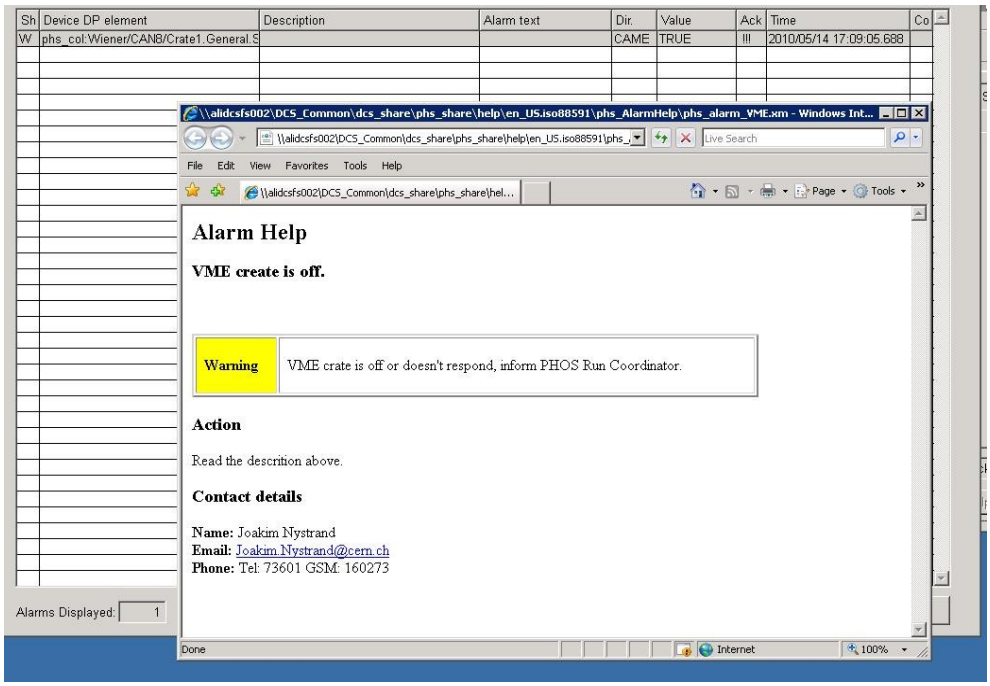
4. Alarm screen

Alarm screen reflects full information about alarms in the ALICE setup. This screen should

be always presented. PHOS shifter selects the messages with prefix "PHOS", all others ones are used for general information. To activate this screen click on the red triangle banner with exclamation mark in the top left part of the ALICE Main User Interface (MUI - button 6), you will see:


JCOP Alarm Screen
Alarm Screen
Print alarms:
Acknowledgement
Acknowledge
Unacknowledged
Individual/Group
acknowledged
Mode
Current Alarms
Historical Alarms
Select Time Range...
kharlov
Alarm Filters
Systems
dcs_globals
dcs_ui
dcs_alerts
Device Name
Device Type
Logical Name
Device Description
Alarm Text
Alarm State
Quick Filters:
None available
Sh | Device DP element | Logical name | Description | Alarm text | Dir. | Value | Ack | Time
W | dcs_ui:SERVICES|DCS_GAS|DCS_GAS.hasAlarms | | | FSM Remote Alarm | CAME | TRUE | | 2008/08/19 08:5
W | dcs_ui:SERVICES|DCS_GAS|DCS_GAS. | | | FSM Summary | CAME | TRUE | | 2008/08/19 08:5
W | dcs_globals:L3BSF17.Temperature | | | NO CONTROL | CAME | 0 °C | x | 2009/07/07 18:1
Da | dcs_globals:FieldMap.FieldMapAvailable | | | Field Map NOT AVAILABLE | WENT | TRUE | !!! | 2009/12/17 12:0
A | dcs_globals:Magnet/ALICEDipole.EmSDown | | | Dipole Emergency ShutDown | CAME | TRUE | !!! | 2009/12/17 12:0
A | dcs_globals:Magnet/ALICESolenoid.EmSDown | | | Solenoid Emergency ShutDown | CAME | TRUE | !!! | 2009/12/17 12:0
W | phs_col:Wiener/CAN8/Crate1.General.Status.GetPowerOn | | | PHOS: VME create is off. | CAME | FALSE | !!! | 2009/12/17 14:0
A | dcs_globals:dip/ts/CSAM/SL-L02-AS-0703-ALARME.alarm | | ALARME PX24 | Level 3 Alarm | WENT | FALSE | !!! | 2009/12/18 07:3
A | dcs_globals:dip/ts/CSAM/SL-L02-AS-0715-ALARME.alarm | | ALARME PX24 | Level 3 Alarm | WENT | FALSE | !!! | 2009/12/18 08:2
A | dcs_globals:csamSummaryAlert.alert | | CSAM | Level 3 alarm(s) | WENT | FALSE | !!! | 2009/12/18 09:0
A | dcs_globals:dip/ts/CSAM/SL-L02-AS-0702-ALARME.alarm | | ALARME PM25 | Level 3 Alarm | WENT | FALSE | !!! | 2009/12/18 09:0
W | dcs_globals:dip/ts/CSAM/Alive.connected | | | Alive counter stopped | WENT | TRUE | !!! | 2009/12/21 12:5

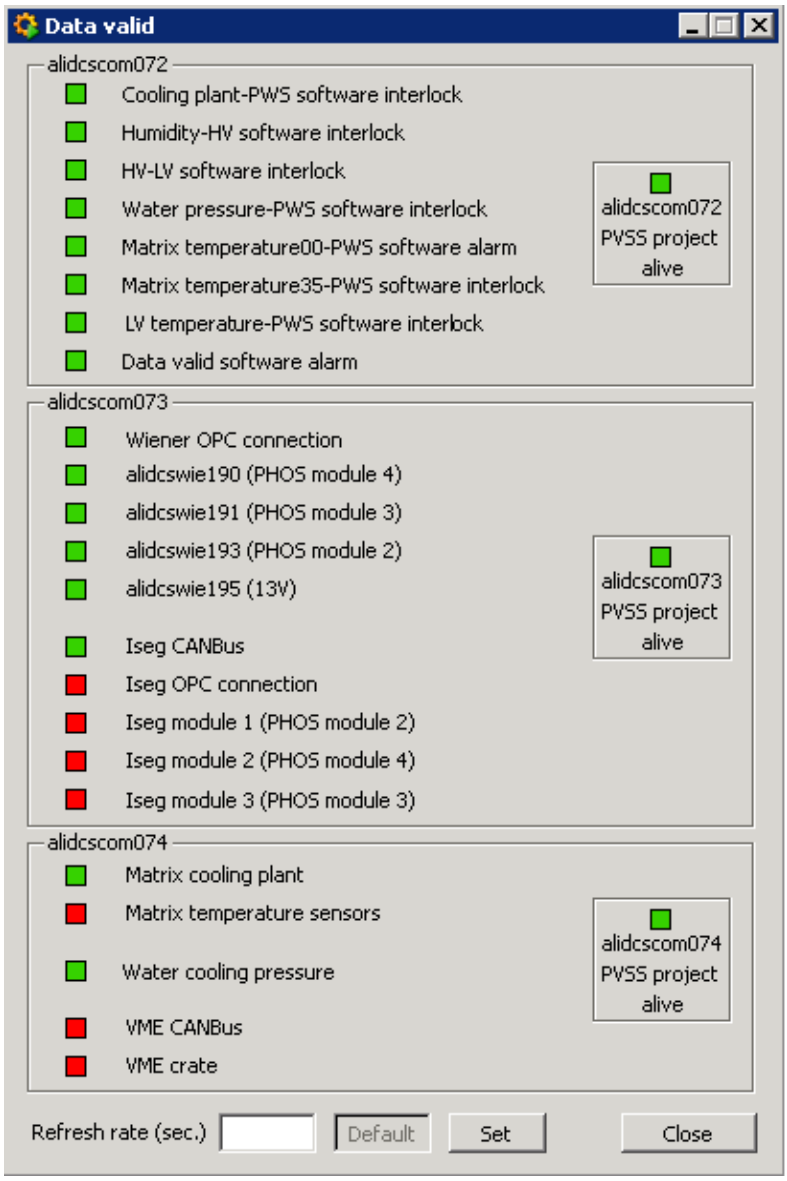
Click Right Mouse button on any message on this screen, then choose “alarm help”, and you


Sh | Device DP element | Description | Alarm text | Dir. | Value | Ack | Time | Co
W | phs_col:Wiener/CAN8/Crate1.General.S | | | CAME | TRUE | !!! | 2010/05/14 17:09:05.688
Alarms Displayed: 1
\\alidcsfs002\DCS_Common\dcs_share\phs_share\help\en_US.iso88591\phs_AlarmHelp\phs_alarm_VME.xm - Windows Int...
File Edit View Favorites Tools Help
Alarm Help
VME create is off.
Warning
VME crate is off or doesn't respond, inform PHOS Run Coordinator.
Action
Read the description above.
Contact details
Name: Joakim Nystrand
Email: Joakim.Nystrand@cern.ch
Phone: Tel: 73601 GSM: 160273
Done
Internet
100%

will see the window with instructions on what to do for this alarm, as shown below

5. Data valid screen

Data valid screen gives full information about status of the PHOS interlocks and alarms with control that different PVSS projects on machines 072, 073, 074 are alive and respond to the main DCS. Each item is presented by a color square. The color of correspondent square is green for normal situation, otherwise if the system does not respond for time greater than 5 s the square becomes red. To activate this screen push the virtual button "Data Valid" in the lower right part of the ALICE Main User Interface (MUI), you will see:



Appendix D: Association of RCUs with DDLs and LDCs.

Module	LDC	DDL	RCU	alidcsdcb15**NN**
2	M3-00-01	1800	0	84
		1801	1	87
	M3-02-03	1802	2	86
		1803	3	85
3	M4-00-01	1804	0	95
		1805	1	94
	M4-02-03	1806	2	93
		1807	3	92
4	M5-00-01	1808	0	88
		1809	1	89
	M5-02-03	1810	2	90
		1811	3	91

Appendix E: PHOS Computers at Point 2

aldaqacr39	**DAQ control**
aldaqpc067	**DAQ LDC**
aldaqpc065	**DAQ GDC**
aldaqdqm16	**DAQ monitoring, to run DAQ DA**
alidcscom001	**DCS gateway, with external in-out connection**
alidcscom075	**DCS linux, NFS server for alidcsdcbXXXX**
alidcscom026	**Trigger to run LTU emulator**
alidcscom072	**DCS windows Server for PVSS**
alidcscom073	**PWS FEE (in future)**
alidcscom074	**PHOS Cooling plant**
alidcsdcb1557	**BB**
alidcsdcb1573	**LED VME**

Appendix F: Events sizes

The event sizes per LDC for empty events with Zero Suppression (threshold 3) should be

M3-00-01	M3-02-03	M4-00-01	M4-02-03	M5-00-01	M5-02-03	
2.3	2.4	2.0	1.1	1.2	1.2	kByte

Deviations up to ±1.0 kByte are OK.

For pedestal runs without Zero Suppression the event sizes should be

M3-00-01	M3-02-03	M4-00-01	M4-02-03	M5-00-01	M5-02-03	
330	330	330	245	245	318	kByte

For LED runs, the event sizes will vary with the LED settings.

Appendix G: Voltages and currents

Typical LV voltages and currents (everything ON, including TRUs)

Module 2	Ch. 0	Ch. 2	Ch. 4	Ch. 6	Ch. 8	13.5 V
LV [V]	4.6	4.2	5.0	5.8	7.2	13.7
I [A]	22	51	64	12	45	15
Module 3	Ch.					
LV [V]	4.6	4.1	5.0	6.1	7.1	13.7
I [A]	20	44	60	11	45	19
Module 4						
LV [V]	4.7	4.2	5.0	6.1	7.0	13.6
I [A]	26	45	58	10	40	13

Typical HV voltages and currents

Module 2	V = 395 V	I = 8 mA*
Module 3	V = 395 V	I = 8 mA
Module 4	V = 350 V	I = 7.0 - 7.5 mA

* except channel 7, I≃ 10 mA.

Appendix H: PHOS Check-list (PHOS DCS Summary panel)

To be convinced that the detector is in a safe, efficient condition, the following parameters should be checked:

1. Check the list of urgent messages PHOS (panel “Alarm screen” – fig.15, available from MAIN DCS GUI – fig.11 - 6)
2. Check the status of interlocks on panel “PHOS DCS summary” (PHOS Check-list, fig.16), available from MAIN DCS GUI – fig.11 - Summary
3. Check the status of Cooling Plant (PHOS) DCS summary.
4. Check the temperature and pressure of FEE water cooling
   Pressure - PHOS DCS summary. It should be above 800 mBar.
   Temperature and pressure – fig.17, are available from
   http://alicedcs.web.cern.ch/AliceDCS/monitoring/main.aspx
   Temperature should be 10°÷20°C, pressure should be less than 985 mBar.

- Check the status of LV (PHOS DCS summary).
- Check the status of HV (PHOS DCS summary.
- Check an average cold volume temperature (PHOS DCS summary),

It should be -24°÷-26°C.

- Check an average warm volume temperature (PHOS DCS summary),

It should be 10°÷25°C.

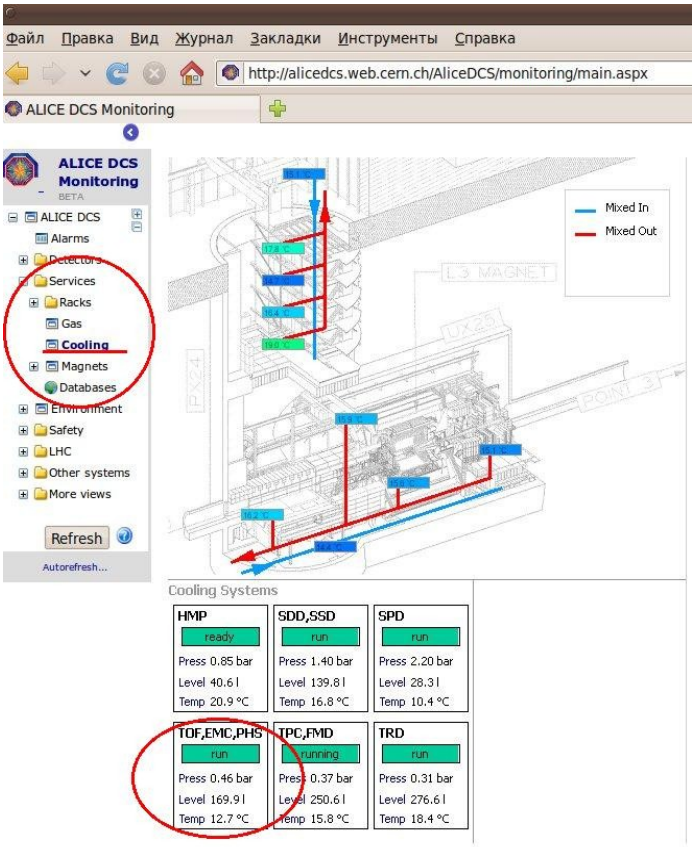


Fig.17. Checking of the temperature and pressure of the FEE water cooling (ALICE-contour).

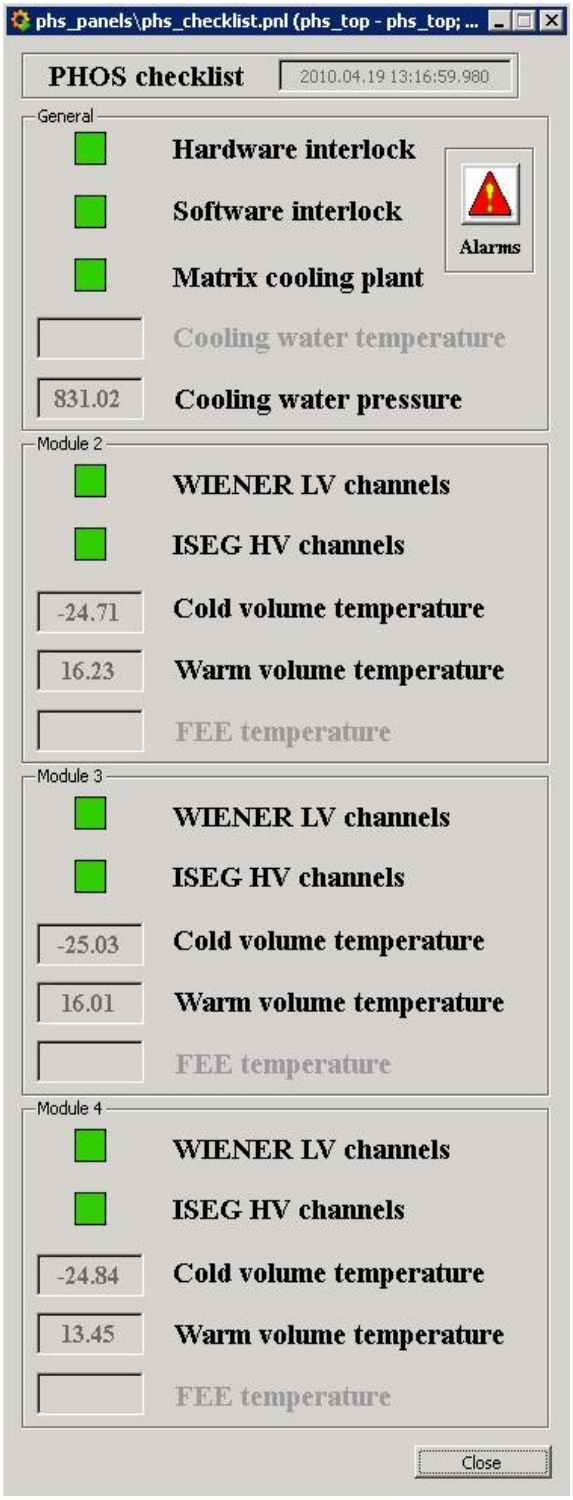


Fig.16.PHOS DCS summary (PHOS Check-list)

Appendix I: Some information about PHOS construction

PHOS consists of two parts: **cold volume and warm volume**, that separated from each other by some isolated structure.

The **cold volume** for each module contains 64x56 crystals with preamplifiers (CSPs), Avalanche Photo Diodes (APDs) and Light Emitting Diodes (LEDs) for monitoring. The crystals and APDs show best production parameters by temperature -25°C, that is supported by Cooling Plant, that operates cooling liquid temperature and humidity. In the **cold volume** for each module there are 24 temperature sensors and 3 and humidity-sensors, which also show the temperature. *Average level of **cold volume** temperature should be around -25°C, average level of humidity should be about ~40%.*

The **warm volume** for each module contains 28x4 Front End Cards (FEEs) - electronic cards (for 32 channels each) in copper boxes. In phos_gui (see below) these cards are marked as 1÷9, A÷E, and connected with 4 Readout Control Units RCU0 ÷ RCU3 and with 8 Trigger Readout Units TRU. All electronics are cooling by water from the ALICE – contour under the negative pressure. *Water temperature data is not included in PHOS DCS GUI yet (but available from web form, see below).* There are FEE's own temperature sensors *(import in PHIS DCS GUI is in progress)* and 8 temperature sensors and 2 humidity-sensors, which also measure the temperatures. *Average **warm volume** temperature should be around +13°C. However, when FEEs are switched off, temperature may reach +6°C. When the temperature is around +6°C, there is a danger of appearing water on FEE cards. Average humidity should be around 5%.*

There is ALICE water cooling cycle, which pass through PHOS modules and cools electronics. The same water passes through PHOS **warm volume, EmCal, TOF and CPV.**

The **warm volume** and **cold volume** are separated by isolating partition. To minimize the humidity level, nitrogen passes through the PHOS module volumes.

Independently from PHOS module volumes there are;

- Low Voltage power supplies – **WIENER** crates cooling by water from the ALICE contour. *Average temperature of each crate channel should be around 20°C.*
- High Voltages HV power supplies – **ISEG crates** cooling by air fan. *Average current level of each ISEG channel should be around 8mA (see Appendix F).*
- **LED** monitoring system, consists of VME crate and **LED** cards are situated in pit, cooling by air fan.
- **Matrix Cooling Plant. It's not the same with ALICE water cooling contour.**

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GLOSSARIUM

MUI - ALICE Main User Interface

RM - Click Right Mouse Button

DRM – Double Click Right Mouse Button

LM - Click Left Mouse Button

DLM – Double Click Left Mouse Button

PWS – Power Supply

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REFERENCIES

[1] PHOS DCS Manual – 2007

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